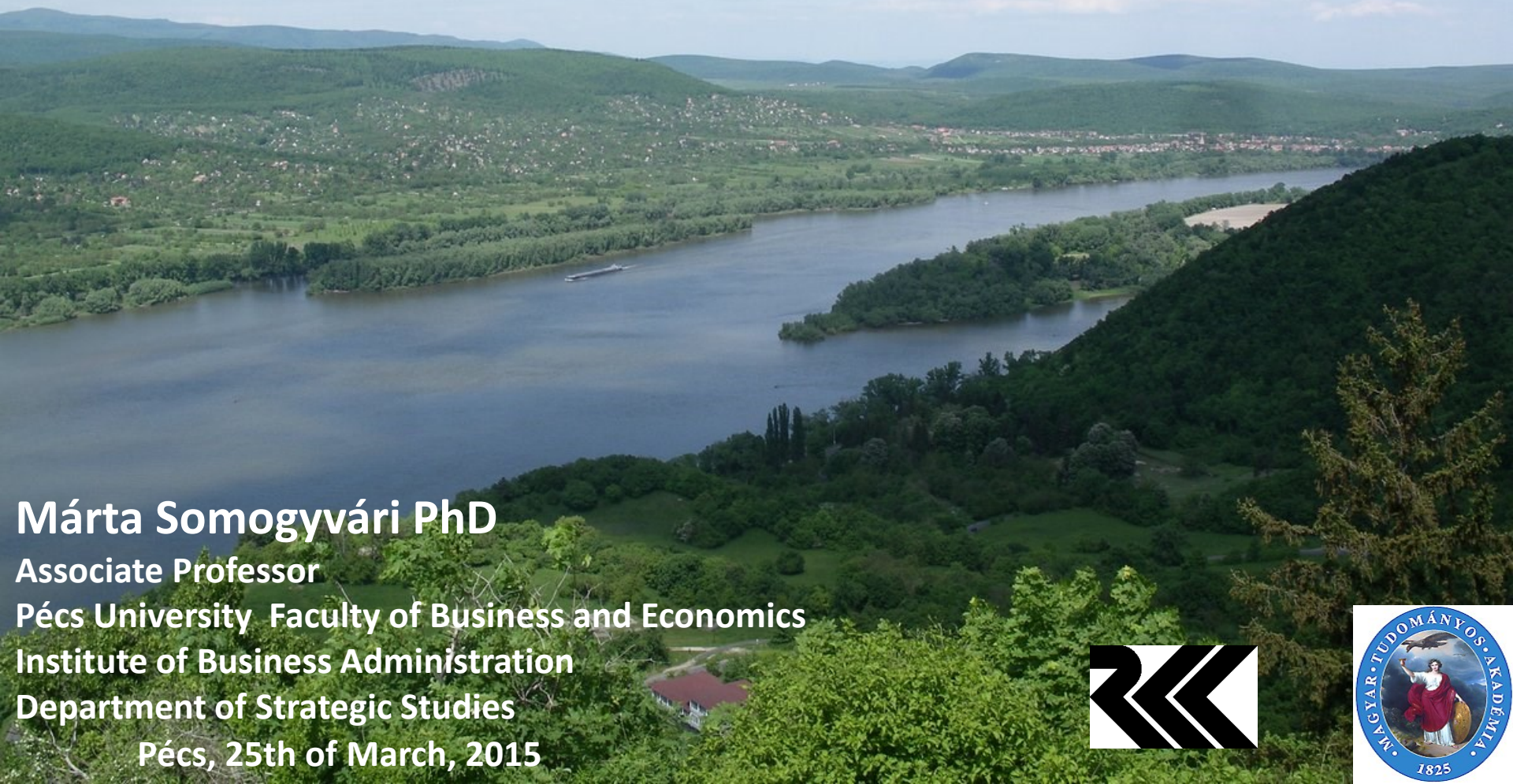


The Signs of Post-fossil Transition in the Energy Landscapes at the River Danube



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Pécs, 25th of March, 2015



Agenda

1. Energy transitions

1. Former energy transitions
2. Unique features of the future energy transition
3. Transition indicators

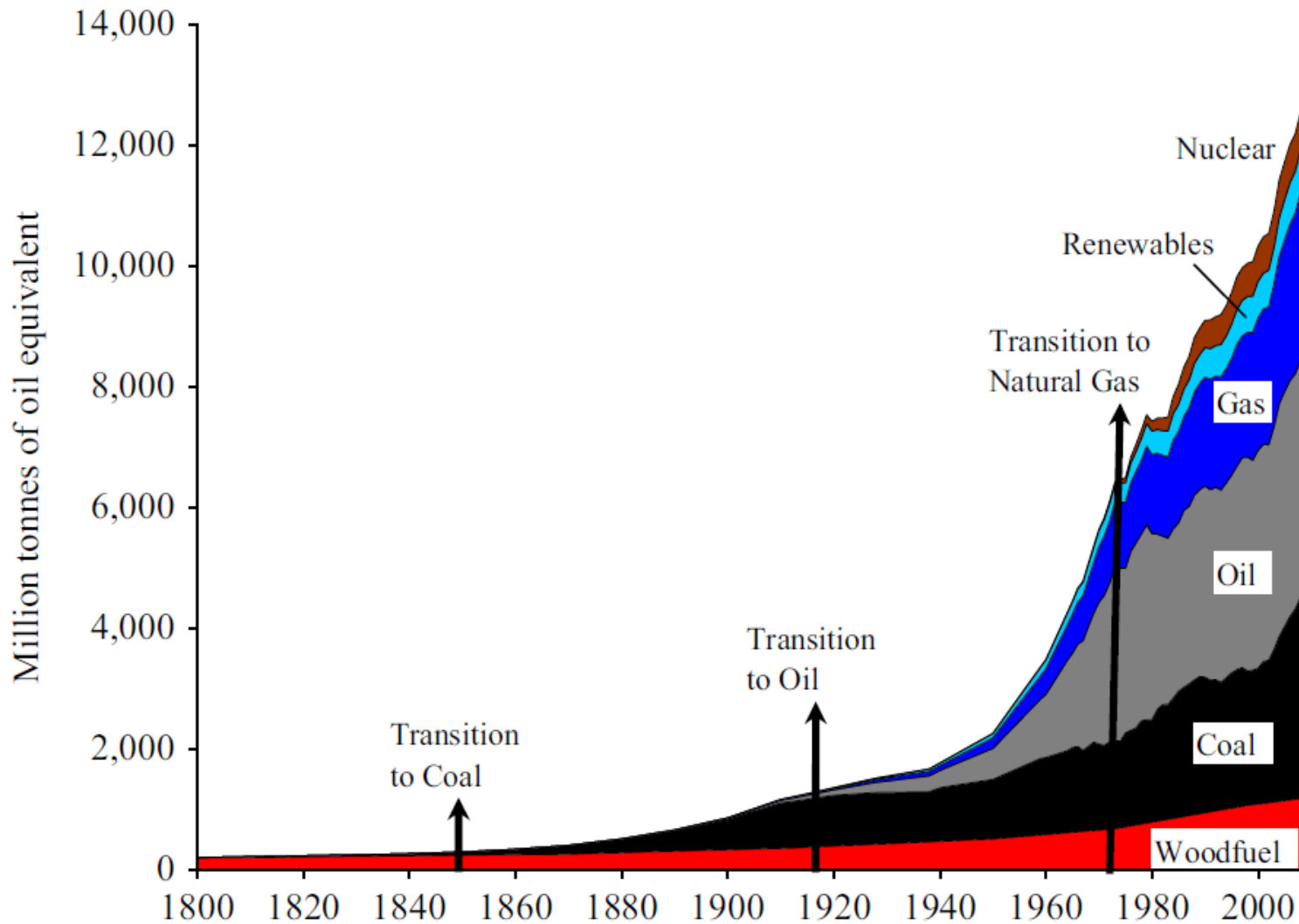
2. Energy landscapes at the river Danube

1. Centre-periphery
2. Energy consumption
3. Electricity mix
4. Transport, heating-cooling
5. Financing the transition

3. Summary



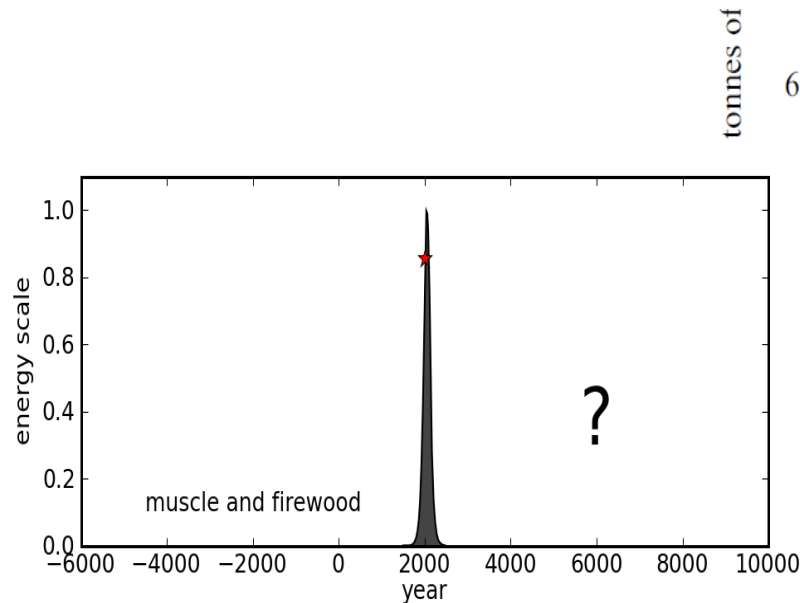
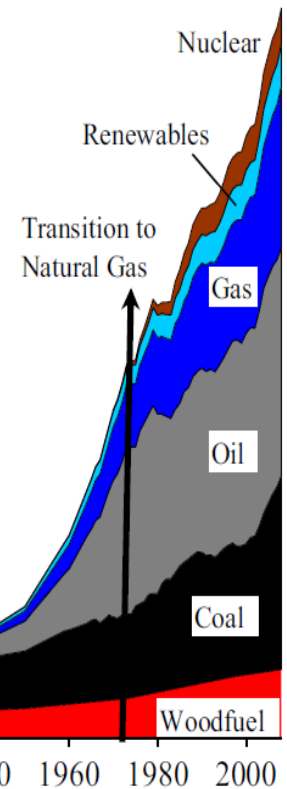
Energy transitions



Source: Fouquet, R., 2009. A brief history of energy. In: Evans, J., Hunt, L.C.

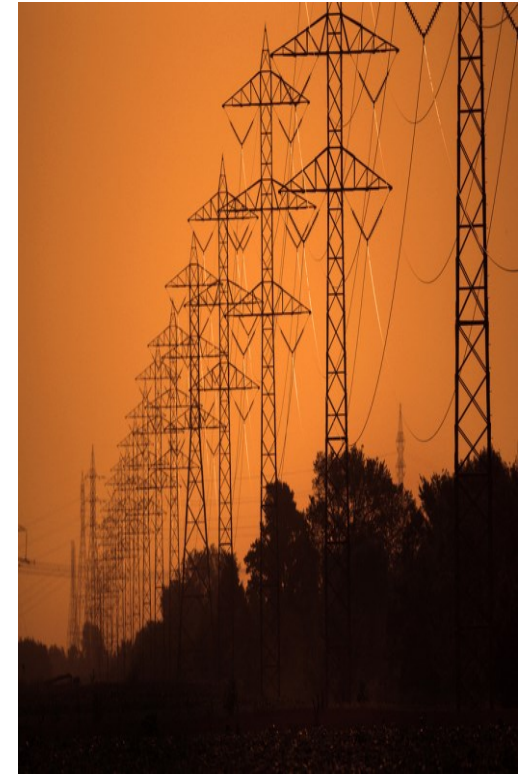
The future energy transition

	PES consumption	Density of PES
Former energy transitions	Old PES consumption is increasing	Change to higher density PES
Post fossil energy transition	Cutting old PES consumption	Change to lower density PES



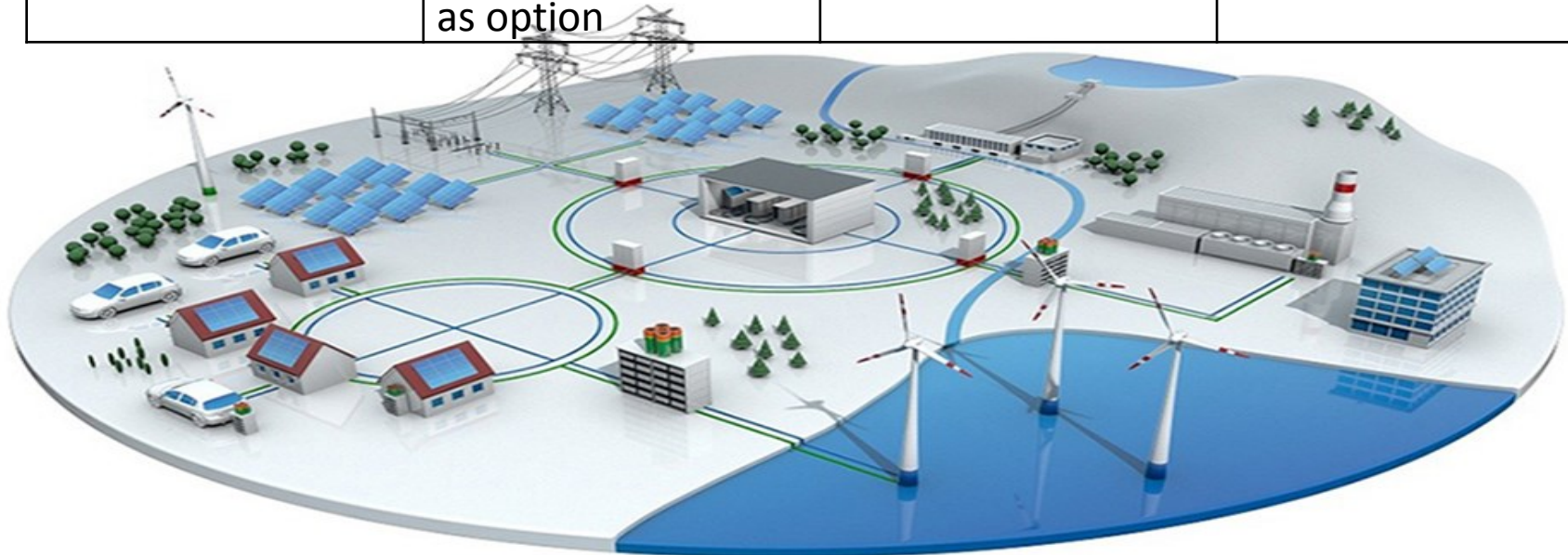
The future energy transition

	Infrastructure	Energy conversion
Former energy transitions	New infrastructure (pipelines, tankers, power grid)	Partly new energy conversion technologies (steam engine, turbines, internal combustion engine)
Post fossil energy transition	Keeping and extending old infrastructure (power grid, gas pipelines, transport of biomass, etc.)	Partly new energy conversion technologies (solar cells, heat pumps)



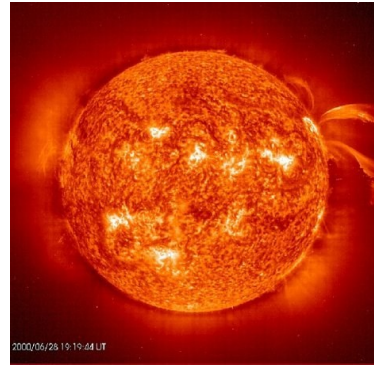
The future energy transition

	Energy system	End-use appliances	Energy services
Former energy transitions	Centralization	New end-use appliances	Cheaper energy and/or better performance
Post fossil energy transition	Centralization or decentralization, and/or distribution as option	Keeping old end-use appliances (electrification)	???

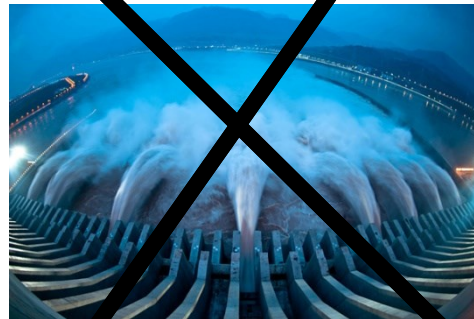


Indicator renewables

Solar
Wind
Geothermal



of hydro
of biomass



Countries at the Danube

Nominal GDP per capita (EUR) 2013

0 5000 10000 15000 20000 25000 30000 35000 40000

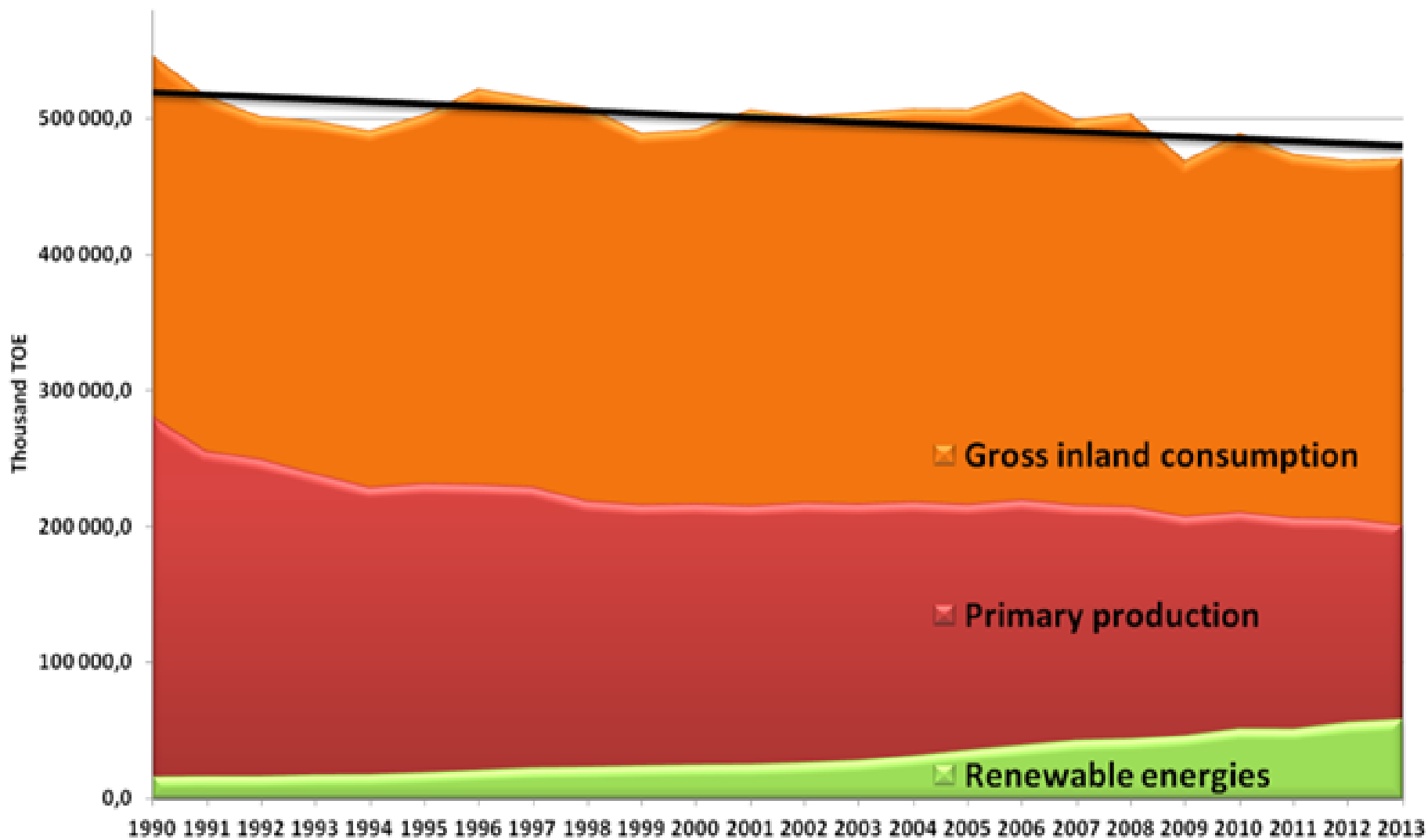


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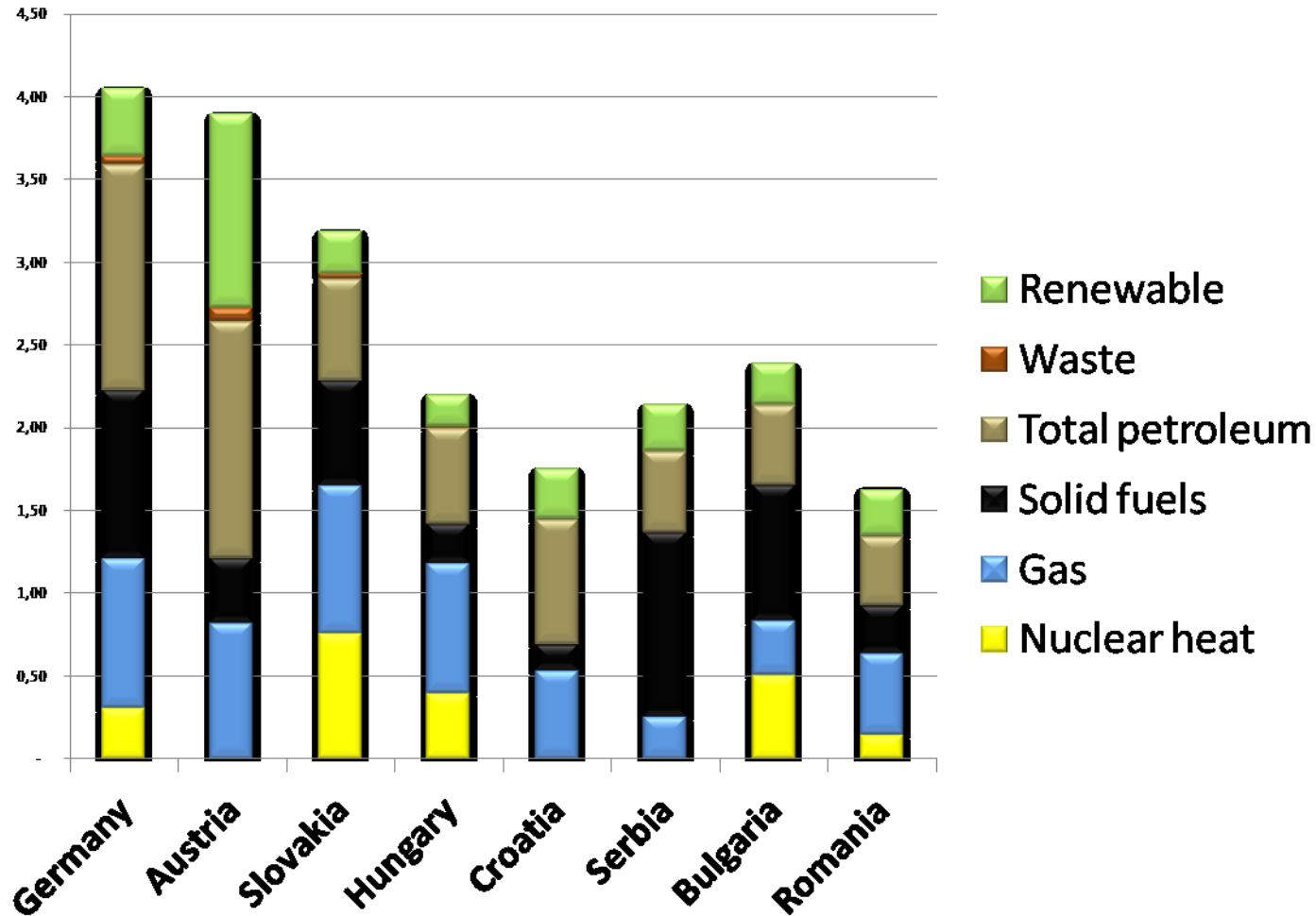


DBU
Deutsche
Bundesstiftung Umwelt

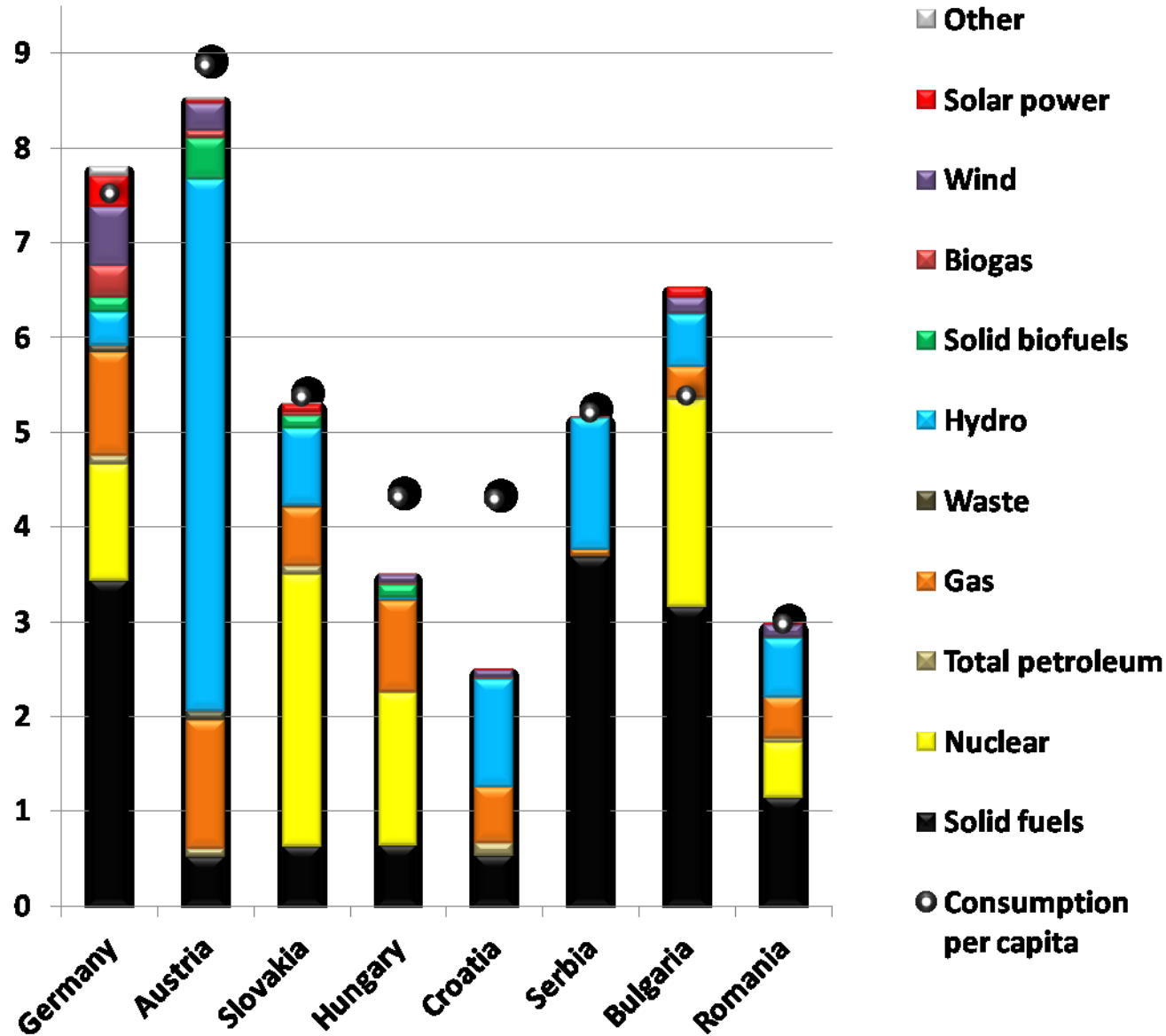
Gross Inland Energy Consumption and Primary Production in the 8 Danube River Countries



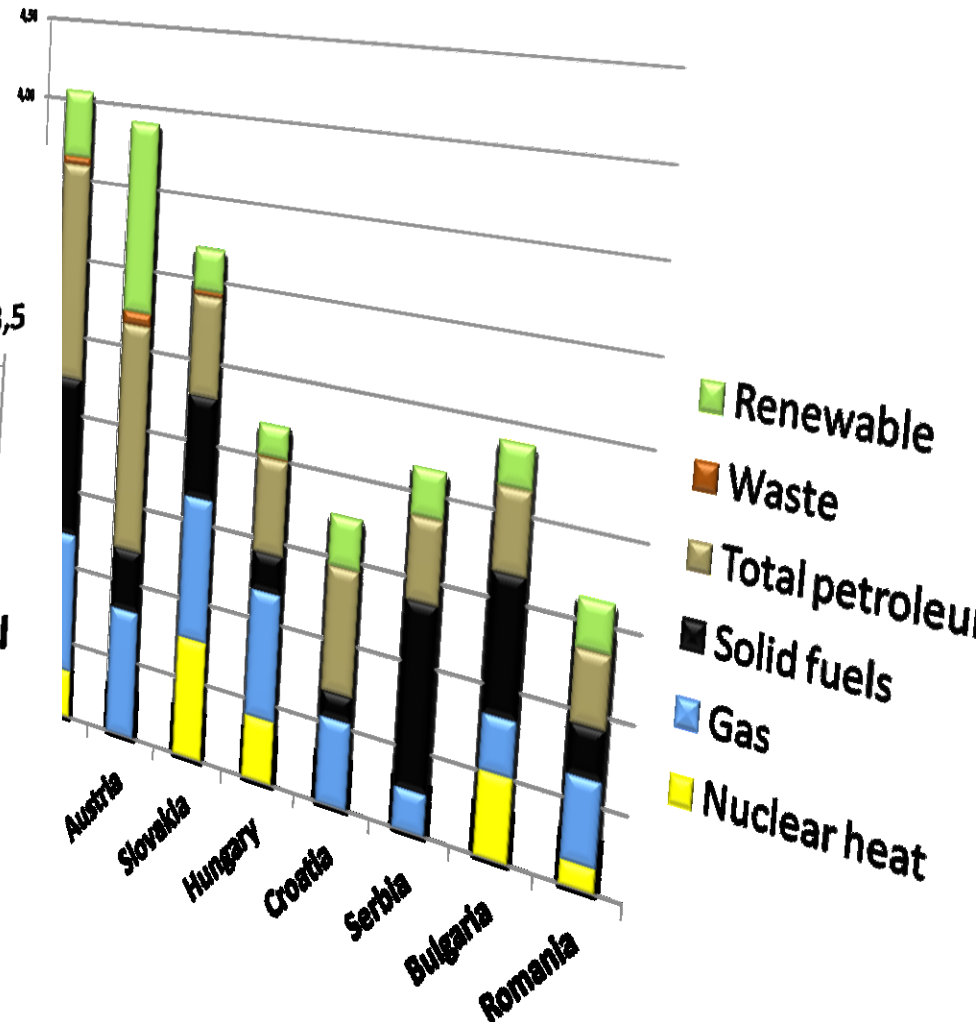
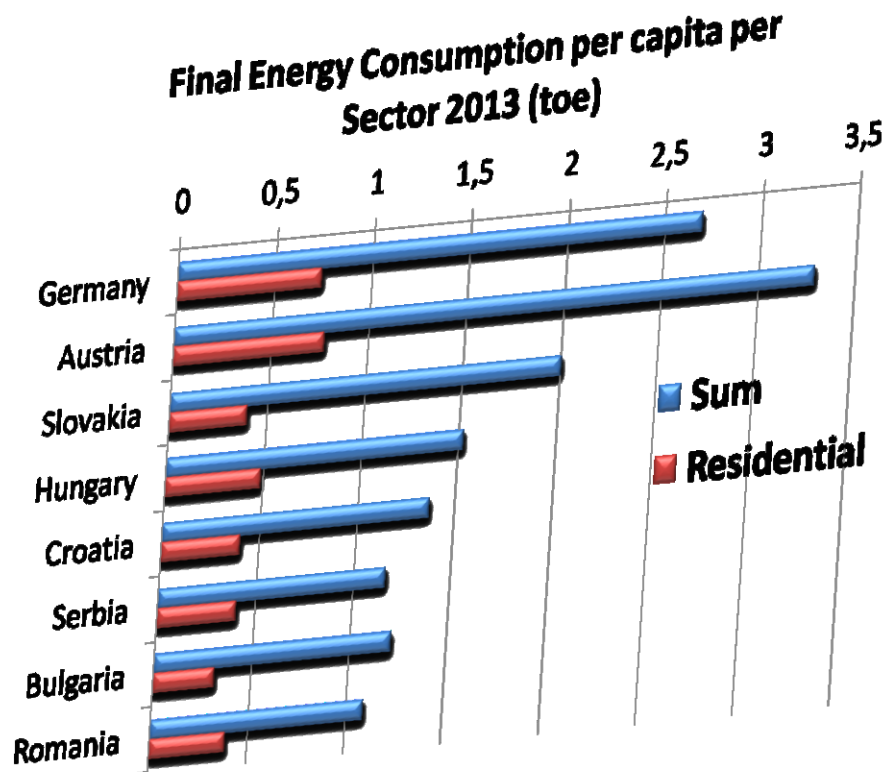
Gross Inland Energy Consumption by Fuel Type per capita 2013 (toe)



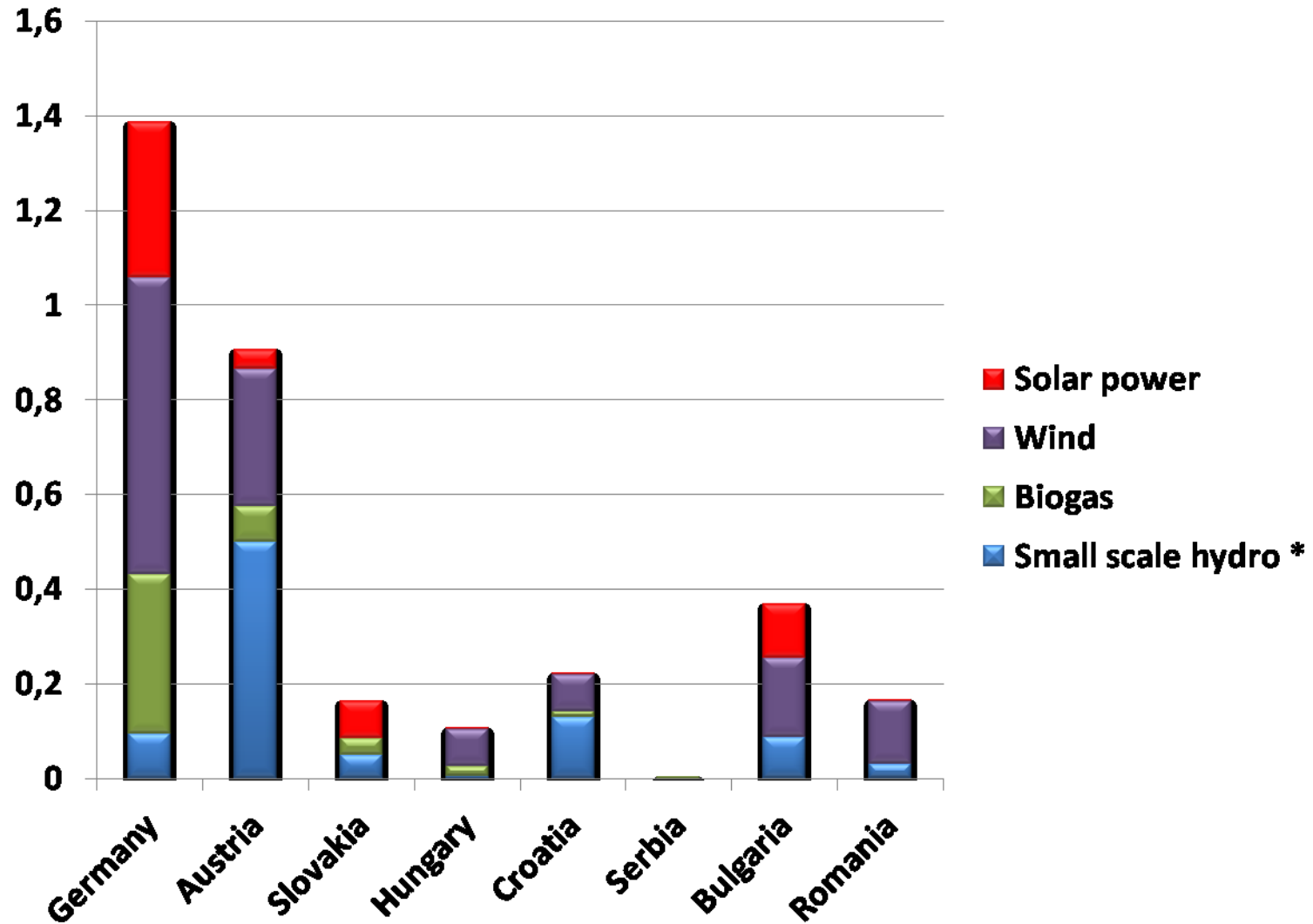
Gross Inland Electricity Generation and Consumption



Gross Inland Energy Consumption by Fuel Type per capita 2013 (toe)



Gross RE Electricity Generation (without Large Scale Hydro and Biomass) per capita 2013 (MWh/a)

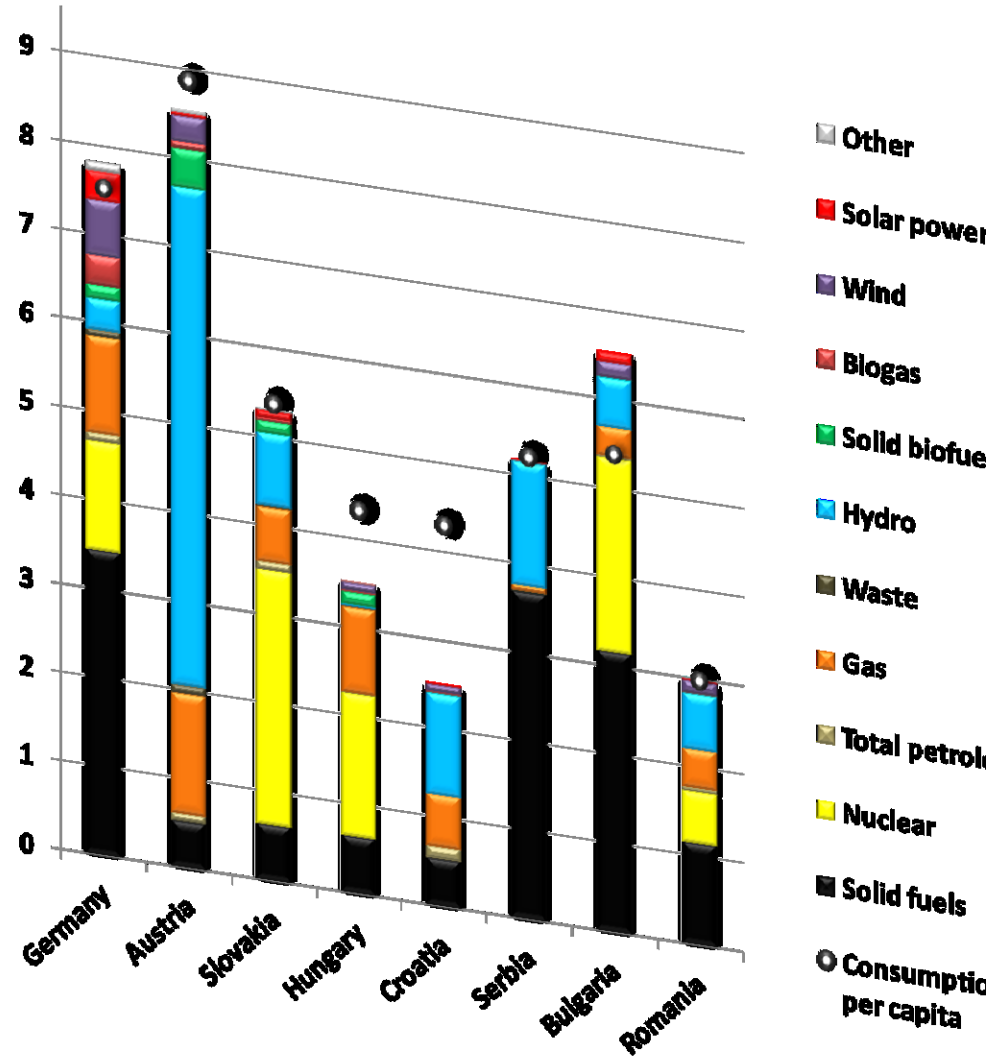


The future energy transition

Electricity consumption per capita (MWh/y)			
	Total	Transition indicator renewables	Share transition indicators
Germany	7.52	1.39	18%
Austria	8.87	0.90	10%
Slovakia	5.37	0.16	3%
Hungary	4.31	0.10	2%
Croatia	4.28	0.22	5%
Serbia	5.20	0.00	0%
Bulgaria	5.38	0.37	7%
Romania	2.97	0.16	6%

The electricity mix and the transition

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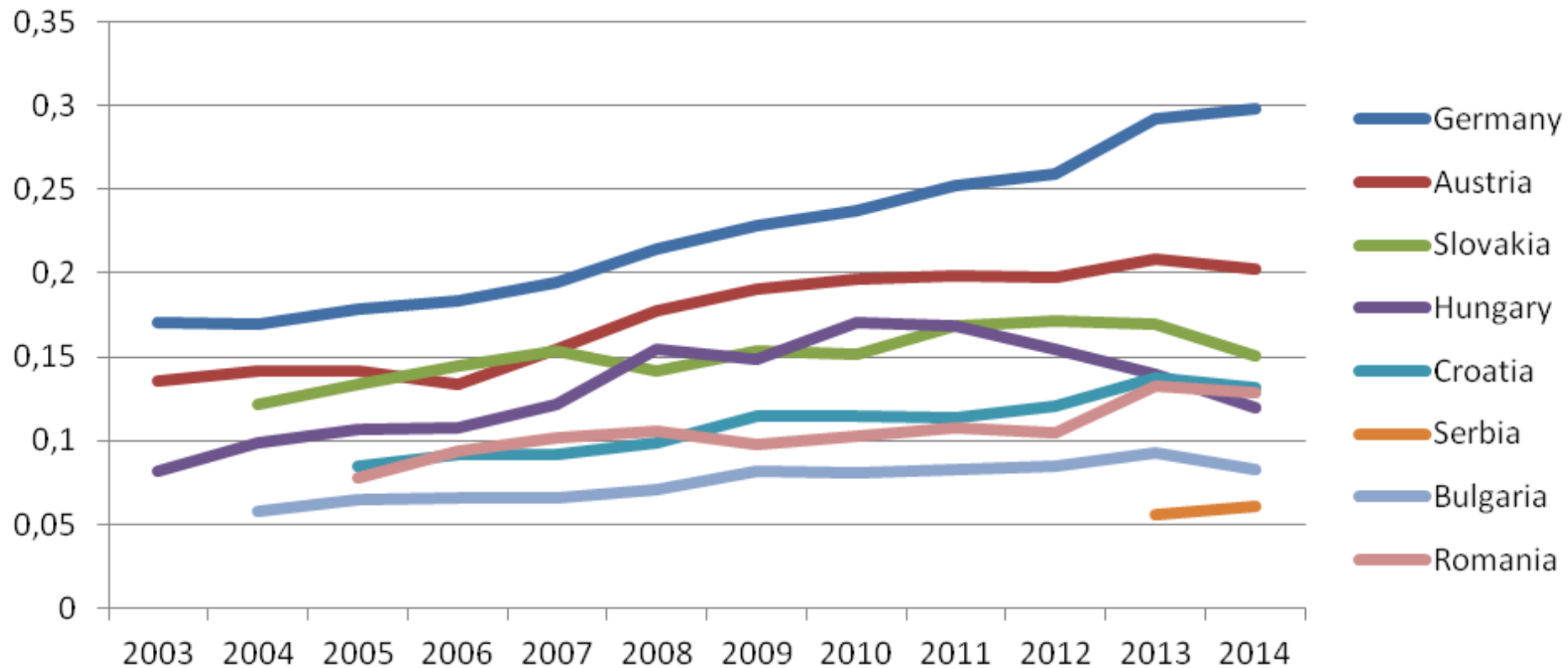
Transport, heating, cooling

	Transport		Heating and Cooling		
	Total RES	Thereof electricity	Share of total RES heating cooling	Thereof solar heating	Thereof geothermal
Germany	6,3%	2%	11,4	0,002	0,02
Austria	7,45	3	44,9	0,68	0,07
Slovakia	5,3	2	17,33	0,22	0,004
Hungary	5,35	3	6,52	0,8	0,01
Croatia	2,15	1	1,83	-	-
Serbia	n.d.	n.d.	n.d.	n.d.	n.d.
Bulgaria	5,63	1	0,34%	0	-
Romania	4,65	2	2,38	0,004	-

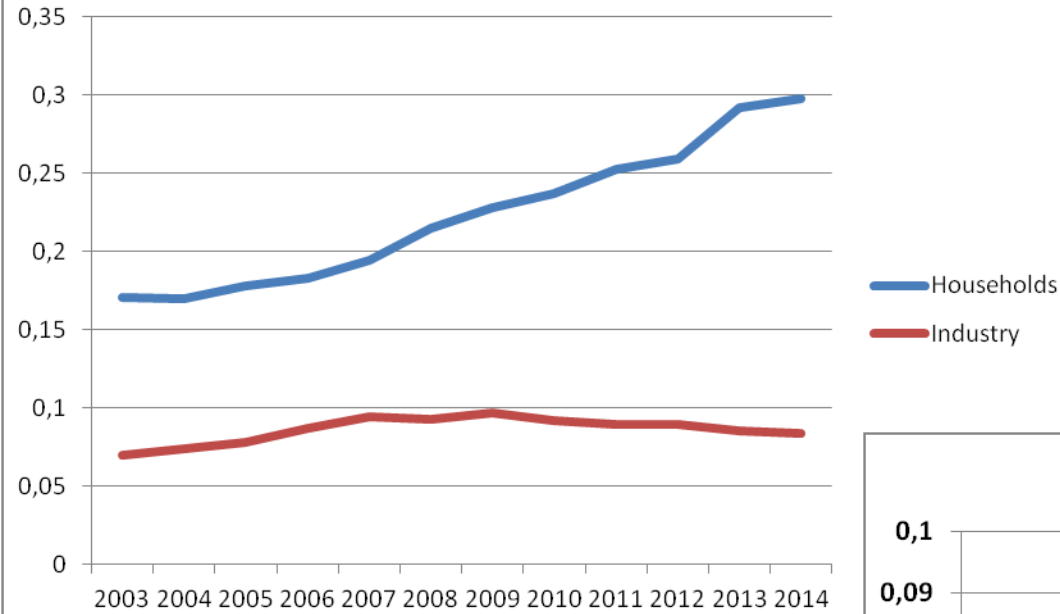
Financing the transition



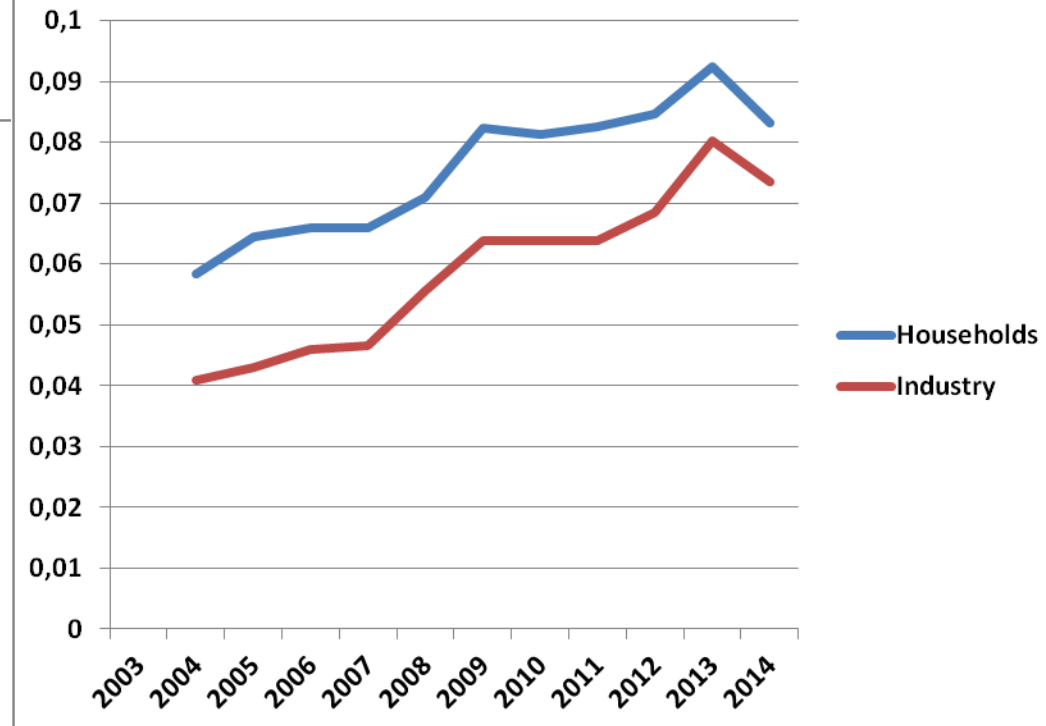
Electricity Prices: Medium Size Households EUR/kWh



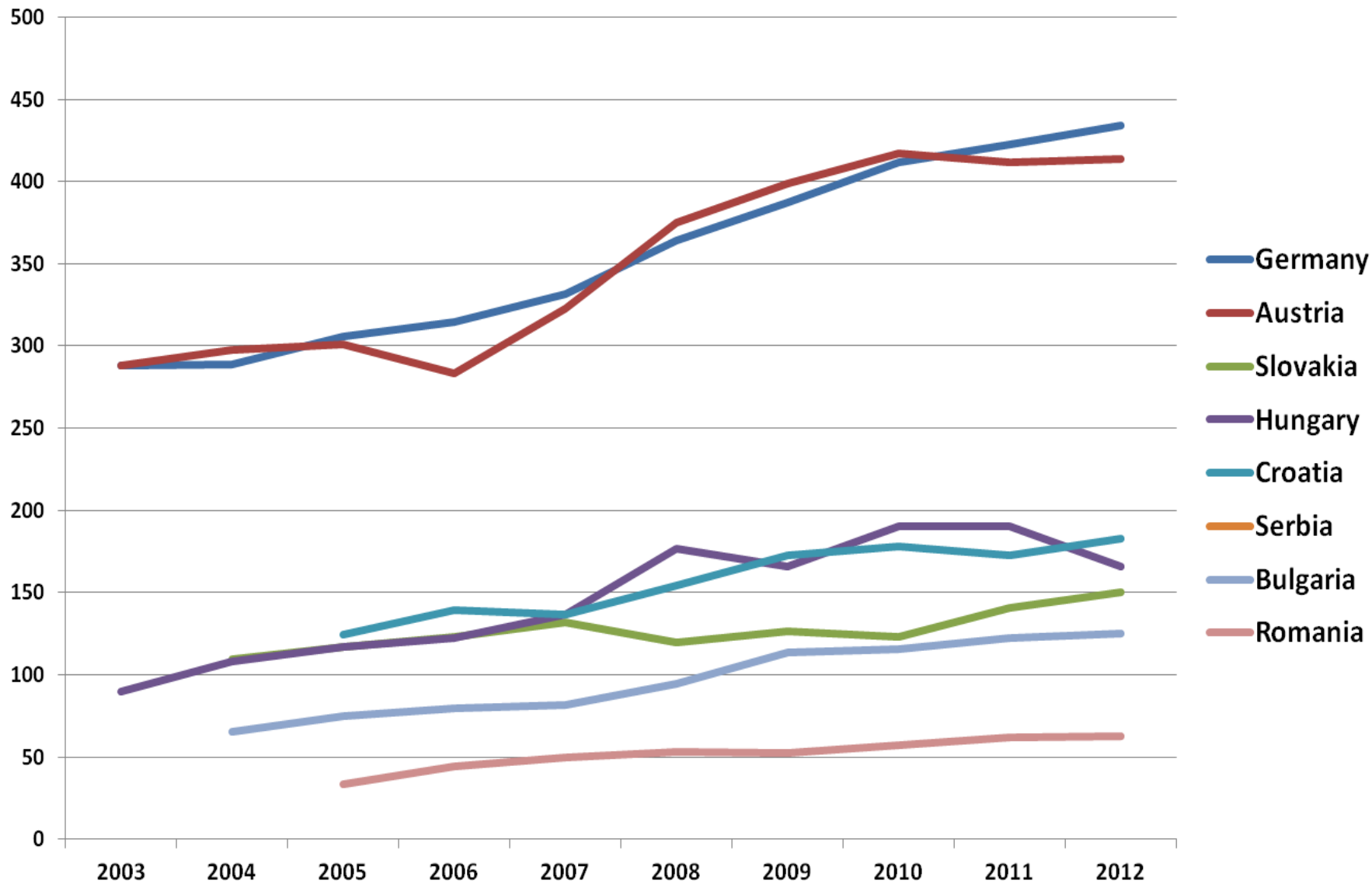
Electricity prices by type of user EUR/kWh in Germany



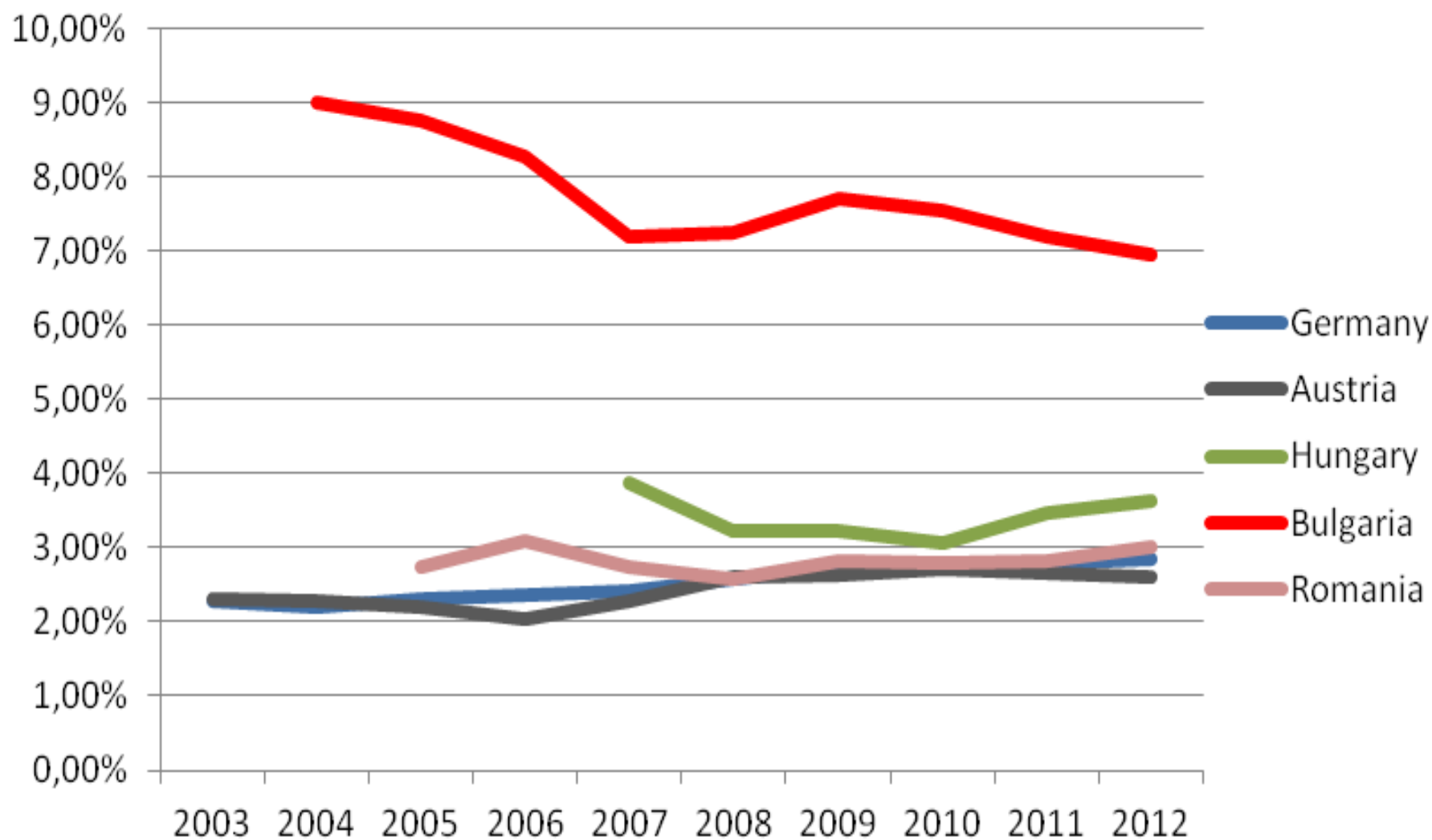
Bulgaria



Expenditure for Electricity per capita (EUR)



Expenditure for electricity net income ratio (per capita)



2013 Bulgarian protests against the first Borisov cabinet



Bulgaria abandons incentives for new renewable energy installations

27/02/2015 |



Bulgaria's parliament abandoned privileged prices for new renewable energy installations to reduce deficits in the energy sector and maintain a cap on consumption.

Wind power farms and photovoltaic parks expanded in 2011, after Bulgaria's government committed to purchase all the energy generated by them. But as the country, the European Union's poorest nation, which has met its 2020 objective for a renewable energy expansion, incentives for co-generating electricity plants raised NEK's deficit to 3.3 billion leva (\$1.89 billion), according to the energy regulator. ContourGlobal decided to negotiate lower prices for the power they produce in Bulgaria.

The renewable energy boom, **incentives** for co-generating power plants and **high costs under long-term power purchase agreements**, have soared **NEK's deficit** to **3.3 billion leva (€1.65 billion)**, the energy ministry has said.

<http://www.euractiv.com/sections/energy/bulgaria-scraps-incentives-new-renewable-energy-installations-312497>

Summary

1. The post fossil energy transition is concentrated on the electricity sector, in the transport and heating sector it is practically non-existent
2. The place where we can detect definitive signs of the post-fossil transition is Germany among the river countries
3. The post fossil energy transition has not yet started in the periphery
4. Considerable share of nuclear energy in the electricity mix seems to be a barrier to the transition
5. The experiences of the centre can not be directly transferred to the periphery